

Trend Study 16A-19-02

Study site name: Flat Canyon.

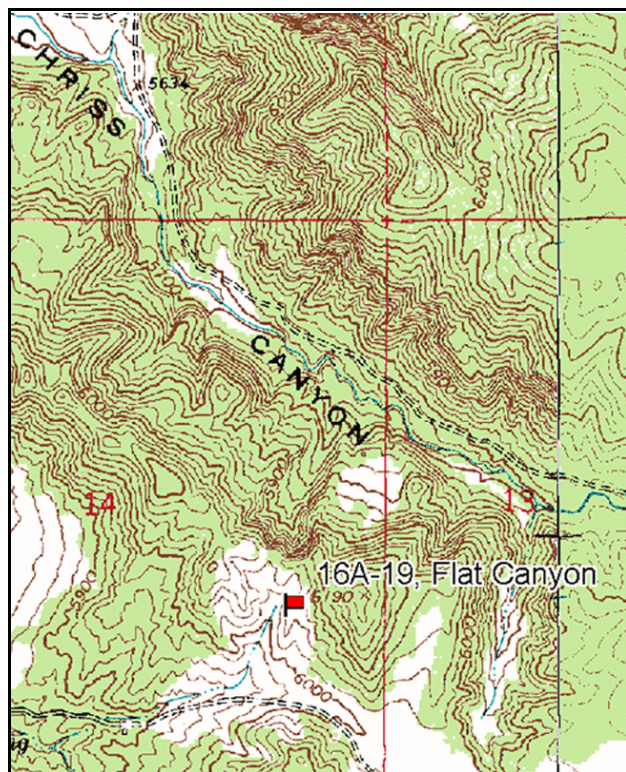
Vegetation type: Bitterbrush - Sagebrush.

Compass bearing: frequency baseline 204 degrees magnetic (line 2-4 @ 171°M).

Frequency belt placement: line 1 (11 & 95ft), line 2 (59ft), line 3 (34ft), line 4 (71ft).

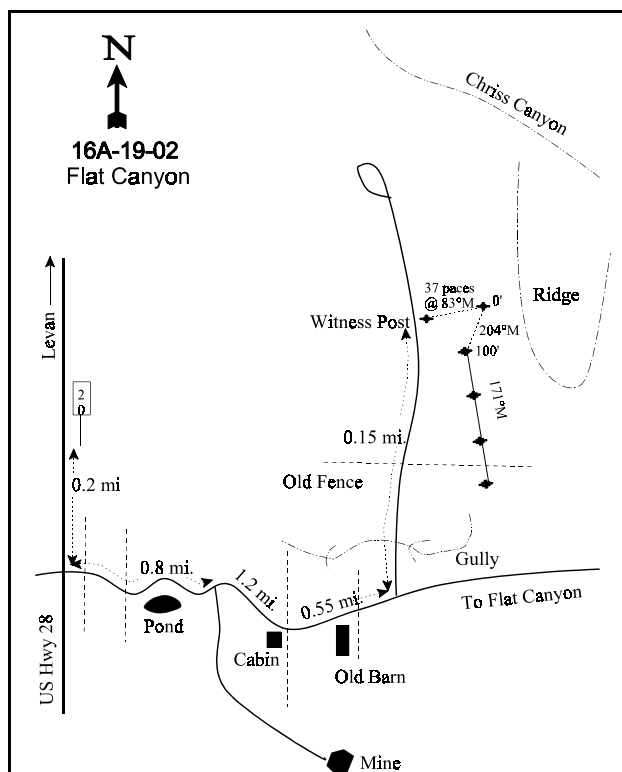
LOCATION DESCRIPTION

From Levan, go south on Highway 28 to 0.2 miles south of mile marker #20. Turn left here (east) and go 0.8 miles to a fork, keep left. Continue 1.2 miles to an old fence by an old cabin where the road makes a 90° turn to the east. Continue up the main road for 0.55 miles to a faint road which turns off to the left down into the sagebrush. Follow this road for 0.15 miles to a witness post on the right side of the road. From here walk up the hill about 37 paces bearing 83degrees magnetic to the 0 foot baseline stake which is marked with browse tag #9084.



Map Name: Skinner Peaks

Township 16S, Range 1W, Section 14



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4362948 N 423904 E

DISCUSSION

Flat Canyon - Trend Study No. 16A-19

The Flat Canyon trend study was established in 1989 on the critical and heavily used winter range in the hills around Flat and Chris Canyons, north of Gunnison. Much of the land around the area is inaccessible, posted private land. The trend study was located on a site typical of the slightly higher elevation range in the area, having a moderate density of juniper with a big sagebrush and bitterbrush understory. Juniper density was estimated at 45 mostly mature trees per acre in 2002. A few pinyon trees were also encountered. Big game use was reported heavy in 1989. Pellet group quadrat frequency of deer was moderately high at 28% in 1997 and 29% in 2002. Data from a pellet group transect read along the study baseline in 2002 estimated 44 deer days use/acre (109 ddu/ha). Most of the deer pellet groups appeared to be from late winter or early spring use. The few cattle pats encountered in 2002 were from the summer of 2001.

The study site is on a small ridge with a varying slope from 35% on the side of the ridge to only 3% to 5% on the ridge top. The original baseline sampled the steeper side of the ridge while the extended baseline from 1997 samples more of the ridge top. The elevation is 6,000 feet. Soil at the site is moderately deep with an estimated effective rooting depth of just over 17 inches. There appears to be a caliche layer in places that varies in depth. The soil penetrometer can apparently penetrate the layer. Rocks appear to be alluvially deposited and are rounded cobble. Large and small gravel sized rocks are common on the surface and throughout the profile. Rocks found at about 1 foot in depth have a calcium carbonate coating. The soil has a sandy loam texture with little structure and a neutral pH of 7.2. Organic matter is limited at only 1.6% and phosphorus may be limiting to plant growth at only 4.4 ppm. Levels below 10 ppm may be limiting to plant growth and development. Some erosion is occurring, but it does not appear to be severe on the site.

Key browse species include mountain big sagebrush and bitterbrush. Mountain big sagebrush had a moderate density of 2,532 plants/acre in 1989, declining to 1,220 plants/acre by 1997. Sagebrush canopy cover averaged 8% in 1989 and nearly 9% in 1997. Half of the sagebrush were classified as mature in 1989. These shrubs were large, moderately hedged with only fair vigor and rather depressed annual growth. Twenty-six percent of the population was decadent but there was an equal number of young and seedling plants. The population became increasingly more mature by 1997 with 72% of the stand consisting of mature plants. Some of the change in density may be the result of the larger sample used in 1997. However, the abundant number of dead plants (1,020 plants/acre), first counted in 1997, suggests a real decline. Density remained stable at about 1,200 plants/acre in 2002. Use was mostly light to moderate with heavy use on a few plants.

The bitterbrush is the interesting component on this site. Growth form varies from prostrate, layering shrubs to 8 foot tall, open tree-like forms. The low form of bitterbrush have been especially heavily hedged. The taller plants have also been heavily browsed with some forage unavailable due to height. A density of 533, all mature plants/acre was estimated in 1989. During the 1997 reading, 480 mature plants/acre were estimated along with 100 young plants/acre and 20 decadent. Use continued to be moderate to heavy with normal vigor. Density remained stable in 2002 at 620 plants/acre. Use was heavier but vigor remained normal on most plants and the number of decadent plants is still low. A small amount of ephedra, low rabbitbrush, and rubber rabbitbrush also occur on the site.

Perennial bunchgrasses are fairly common, but widely spaced. The prevalent species are bluebunch wheatgrass, Sandberg bluegrass, and needle-and-thread. They had been only lightly grazed in 1989 with no utilization apparent by late May of 1997 or 2002. Cheatgrass is also abundant. It provided 48% of the grass cover in 1997 and was found primarily under shrub and tree canopies. Drought conditions have caused a significant decline in cheatgrass frequency and cover in 2002. However, it is still abundant. Forbs are fairly diverse, but unproductive.

1989 APPARENT TREND ASSESSMENT

The slight erosion on the site does not appear to be any more serious than it ever has been. A further loss of understory vegetation would be detrimental to the soil condition, as seen in nearby stands of juniper. There are few young of the key browse species, mountain big sagebrush and bitterbrush, but the age class distribution is fairly stable. The heavy use and reduced vigor on the sagebrush and bitterbrush could cause a future downward trend. Overall, the vegetative trend appears stable.

1997 TREND ASSESSMENT

Soil trend appears stable. Erosion is still occurring yet it does not appear severe. Cover of bare soil has increased slightly, while percent litter cover declined from 42% to 32%. Some of the changes may be the result of the larger sample taken in 1997. Trend for browse is stable. Density of mountain big sagebrush has declined and dead plants are nearly as numerous as live ones. Some of the dead sagebrush appear to have died recently but not due to excessive use. Seedlings and young appear to be abundant enough to maintain the current population. Bitterbrush is moderately to heavily hedged, decadency is only 3%, vigor is good, and recruitment is adequate. Trend for the herbaceous understory is stable. Sum of nested frequency of perennial grasses has declined slightly, while frequency of perennial forbs has increased.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable, but poor composition (3)

2002 TREND ASSESSMENT

Trend for soil remains stable with similar ground cover characteristics compared to 1997. Trend for browse is stable for the key species, mountain big sagebrush and antelope bitterbrush. Use has increased somewhat compared to 1997, but densities have remained stable and vigor is normal on most plants. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses has increased slightly while frequency of perennial forbs has declined. However, perennial forbs are rare and provide little cover. Drought conditions in 2001 and 2002 have caused a significant decline in the nested frequency of cheatgrass, an annual. It is still abundant but it currently only provides 11% of the total grass cover, down from 48% in 1997.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16A, Study no: 19

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron spicatum	_b 171	_a 122	_{ab} 150	73	50	60	3.44	6.67
G	Bromus japonicus (a)	-	_a -	_b 20	-	-	8	-	.06
G	Bromus tectorum (a)	-	_b 275	_a 211	-	91	78	5.80	1.19
G	Oryzopsis hymenoides	_b 27	_{ab} 11	_a -	11	5	-	.10	.01
G	Poa secunda	_a 20	_b 65	_b 55	8	26	25	1.22	1.53
G	Sitanion hystrix	2	6	-	1	2	-	.15	-
G	Stipa comata	38	26	41	20	13	21	1.33	1.82
Total for Annual Grasses		0	275	231	0	91	86	5.80	1.26
Total for Perennial Grasses		258	230	246	113	96	106	6.25	10.05
Total for Grasses		258	505	477	113	187	192	12.05	11.31
F	Agoseris glauca	_a -	_b 20	_b 11	-	9	5	.27	.05
F	Alyssum alyssoides (a)	-	_a 1	_b 25	-	1	9	.00	.04
F	Allium spp.	-	-	2	-	-	1	-	.00
F	Arabis spp.	-	-	1	-	-	1	-	.00
F	Astragalus agrestis	-	4	5	-	3	3	.07	.04
F	Astragalus eurekensis	-	-	6	-	-	3	-	.04
F	Castilleja linariaefolia	-	2	-	-	2	-	.06	-
F	Calochortus nuttallii	_a -	_c 41	_b 15	-	18	5	.16	.05
F	Chaenactis douglasii	-	_b 25	_a 2	-	9	1	.69	.00
F	Chorispora tenella (a)	-	4	3	-	1	1	.03	.00
F	Cirsium spp.	-	5	-	-	2	-	.04	-
F	Collinsia parviflora (a)	-	-	3	-	-	1	-	.00
F	Crepis acuminata	-	-	-	-	-	-	-	.00
F	Cryptantha spp.	_a 6	_b 16	_a -	3	8	-	.11	-
F	Descurainia pinnata (a)	-	-	7	-	-	3	-	.01
F	Epilobium brachycarpum (a)	-	3	7	-	1	4	.00	.02
F	Erodium cicutarium (a)	-	2	3	-	1	1	.00	.00
F	Eriogonum racemosum	-	-	2	-	-	1	-	.03
F	Galium aparine (a)	-	-	1	-	-	1	-	.00
F	Gilia spp. (a)	-	_b 61	_a 11	-	23	7	2.15	.03
F	Lactuca serriola	-	4	-	-	1	-	.00	-
F	Machaeranthera canescens	3	-	-	2	-	-	.00	-
F	Microsteris gracilis (a)	-	-	3	-	-	3	-	.01
F	Phlox austromontana	-	6	-	-	3	-	.18	-
F	Phlox longifolia	9	9	6	6	4	4	.04	.02
F	Polygonum douglasii (a)	-	3	-	-	1	-	.00	-
F	Streptanthus cordatus	3	5	1	1	3	1	.04	.00

T y p e	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
F	Tragopogon dubius	-	9	-	-	5	-	.10	-
F	Veronica biloba (a)	-	-	2	-	-	1	-	.00
F	Zigadenus paniculatus	-	-	3	-	-	1	-	.03
Total for Annual Forbs		0	74	65	0	28	31	2.20	0.15
Total for Perennial Forbs		21	146	54	12	67	26	1.80	0.28
Total for Forbs		21	220	119	12	95	57	4.00	0.43

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Herd unit 16A, Study no: 19

T y p e	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Artemisia tridentata vaseyana	43	44	8.83	10.96
B	Chrysothamnus viscidiflorus viscidiflorus	4	4	.15	.06
B	Ephedra viridis	0	0	-	.00
B	Gutierrezia sarothrae	7	4	.35	.30
B	Juniperus osteosperma	1	4	2.96	6.56
B	Opuntia spp.	3	0	.03	-
B	Purshia tridentata	14	18	3.04	4.09
B	Quercus gambelii	0	1	-	-
Total for Browse		72	75	15.37	21.99

CANOPY COVER --

Herd unit 16A, Study no: 19

Species	Percent Cover		Point-Quarter Tree Data	
	'97	'02	Trees per Acre '97	Average diameter (in) '02
Juniperus osteosperma	12	10	45	7.5
Pinus edulis	-	-	10	4.6

Key Browse Annual Leader Growth

Herd unit 16A, Study no: 19

Species	Average leader growth (in) '02
Artemisia tridentata vaseyana	2.1
Purshia tridentata	1.7

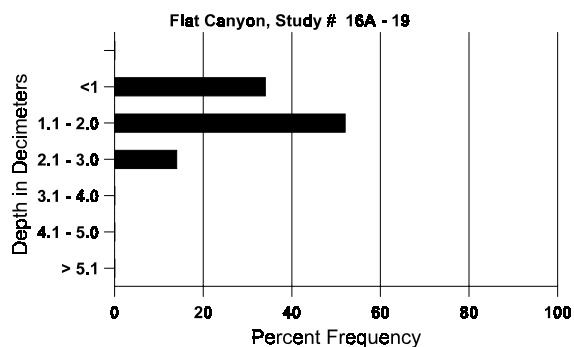
BASIC COVER --
Herd unit 16A, Study no: 19

Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'89	'97	'02
Vegetation	340	294	4.75	26.96	31.86
Rock	251	260	8.75	7.50	9.19
Pavement	313	306	21.00	15.75	11.90
Litter	379	365	42.25	32.46	35.46
Cryptogams	61	34	1.25	.92	.76
Bare Ground	294	298	22.00	28.46	30.32

SOIL ANALYSIS DATA --
Herd Unit 16A, Study no: 19, Flat Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
17.2	50.8 (17.1)	7.2	70.4	15.8	13.8	1.6	4.4	153.6	.5

Stoniness Index



PELLET GROUP FREQUENCY --
Herd unit 16A, Study no: 19

Type	Quadrat Frequency		Pellet Transect	
	'97	'02	Pellet Groups per Acre 02	Days Use per Acre (ha) 02
Rabbit	2	23	-	-
Horse	-	1	-	-
Elk	1	-	-	-
Deer	28	29	574	44 (109)
Cattle	-	2	26	2 (5)

BROWSE CHARACTERISTICS --

Herd unit 16A, Study no: 19

A Y G R E	Form Class (No. of Plants)	Vigor Class									Plants Per Acre	Average (inches)		Total			
		1	2	3	4	5	6	7	8	9		1	2		3	4	Ht.
Artemisia tridentata vaseyana																	
S	89	1	-	-	-	-	-	-	-	-	-	1	-	-	66		1
	97	6	-	-	-	-	-	-	-	-	6	-	-	-	120		6
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
Y	89	9	-	-	-	-	-	-	-	-	8	1	-	-	600		9
	97	7	-	-	1	-	-	-	-	-	8	-	-	-	160		8
	02	3	-	-	1	-	-	-	-	-	4	-	-	-	80		4
M	89	3	15	1	-	-	-	-	-	-	8	4	7	-	1266	20	24
	97	37	6	-	1	-	-	-	-	-	44	-	-	-	880	22	35
	02	30	11	1	3	1	-	-	-	-	46	-	-	-	920	19	29
D	89	8	-	2	-	-	-	-	-	-	5	4	-	1	666		10
	97	9	-	-	-	-	-	-	-	-	8	-	-	1	180		9
	02	4	9	-	1	-	-	-	-	-	7	-	-	7	280		14
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	1020		51
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	580		29
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change						
'89		39%			08%			21%			-52%						
'97		10%			00%			02%			+ 5%						
'02		33%			02%			11%									
Total Plants/Acre (excluding Dead & Seedlings)												'89	2532	Dec:	26%		
												'97	1220		15%		
												'02	1280		22%		
Chrysothamnus nauseosus albicaulis																	
Y	89	-	-	1	-	-	-	-	-	-	1	-	-	-	66		1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0
M	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66	20	13
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	28	33
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-
% Plants Showing		Moderate Use			Heavy Use			Poor Vigor			%Change						
'89		00%			50%			00%									
'97		00%			00%			00%									
'02		00%			00%			00%									
Total Plants/Acre (excluding Dead & Seedlings)												'89	132	Dec:	-		
												'97	0		-		
												'02	0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Chrysothamnus viscidiflorus viscidiflorus																		
Y	89	1	-	-	-	-	-	-	-	-	-	-	1	-	66			1
	97	2	-	-	-	-	-	-	-	-	-	2	-	-	40			2
	02	1	-	-	-	-	-	-	-	-	-	1	-	-	20			1
M	89	3	1	1	-	-	-	-	-	-	5	-	-	-	333	12	13	5
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	13	19	5
	02	1	-	-	2	-	-	-	-	-	3	-	-	-	60	11	15	3
D	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		14%			14%			14%			-70%							
'97		00%			00%			00%			-14%							
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	465	Dec:	14%			
												'97	140		0%			
												'02	120		33%			
Ephedra viridis																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	18	13	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	16	13	0
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	0		-			
												'02	0		-			

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	9	-	-	-	-	-	-	-	-	-	-	-	-	180		9	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	58	-	-	-	-	-	-	-	-	-	-	-	-	1160		58	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	12	-	-	-	-	-	-	-	-	-	-	-	-	240	10	14	
	02	4	-	-	1	-	-	-	-	-	-	-	-	-	100	4	6	
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	02	14	-	-	-	-	-	1	-	-	-	-	-	15	300		15	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	300		15	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%			-71%							
'02		00%			00%			75%										
Total Plants/Acre (excluding Dead & Seedlings)												'89		0	Dec:	0%		
												'97		1400		0%		
												'02		400		75%		
Juniperus osteosperma																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	1	-	-	-	-	-	-	20	-	-	
	02	3	-	-	-	-	-	1	-	-	-	-	-	-	80	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%			+75%							
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89		0	Dec:	-		
												'97		20		-		
												'02		80		-		
Opuntia spp.																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	4	-	-	-	-	-	-	-	-	-	-	-	-	80	3	10	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89		0	Dec:	-		
												'97		80		-		
												'02		0		-		

A G E	Y R	Form Class (No. of Plants)									Vigor Class				Plants Per Acre	Average (inches) Ht. Cr.		Total
		1	2	3	4	5	6	7	8	9	1	2	3	4				
Purshia tridentata																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	2	3	-	-	-	-	-	-	-	5	-	-	-	100		5	
	02	-	1	-	-	-	-	-	-	-	1	-	-	-	20		1	
M	89	-	5	3	-	-	-	-	-	-	8	-	-	-	533	15	32	
	97	-	17	6	-	-	1	-	-	-	24	-	-	-	480	57	46	
	02	7	3	9	-	2	5	-	-	-	26	-	-	-	520	21	56	
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20		1	
	02	3	1	-	-	-	-	-	-	-	1	-	-	3	80		4	
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0		0	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20		1	
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	100		5	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		63%			38%			00%			+11%							
'97		67%			27%			00%			+ 3%							
'02		23%			45%			10%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	533	Dec:	0%			
												'97	600		3%			
												'02	620		13%			
Quercus gambelii																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	
	02	1	-	-	-	-	-	-	-	-	1	-	-	-	20	-	-	
% Plants Showing		<u>Moderate Use</u>			<u>Heavy Use</u>			<u>Poor Vigor</u>			<u>%Change</u>							
'89		00%			00%			00%										
'97		00%			00%			00%										
'02		00%			00%			00%										
Total Plants/Acre (excluding Dead & Seedlings)												'89	0	Dec:	-			
												'97	0		-			
												'02	20		-			